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# Analysis of the Badminton Match-throwing in London Olympics

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## Abstract

On the 2012 London Olympics Games, the badminton match-throwings have got wide attention across the world. Based on the systematic information collection from the Web and newspapers, this paper makes an element analysis on the key factors that cause the lacklustre performances from the perspective of Extenics. Using extension transformation method we make an attempt to find a systematic and optimal approach for solving such incompatible problems in sports cases based on extension set theory and game theory. The quantitative analysis method and extension innovation method will be a new tool for management innovation in sports field.

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## 1. Introduction

On July 31st, 2012, London Olympic Games, the badminton world doubles champions Yu Yang and Wang Xiaoli of China played against South Korean pairs Jung Kyun-eun/Kim Ha-na and Ha Jung-eun/Kim Min-jung in the last competition of Group A. If the Chinese duo won the game, they would enter the semi-final as the No. 1 of the group and encounter their teammates Tian Qing and Zhao Yunlei, who won through to the semi-final as No 2 of Group D. In order to avoid meeting their teammates in the knockout stage and ensure that China could have the chance to harvest both the gold and silver medals of the event, the Chinese pairing Yu Yang and Wang Xiaoli tried to lose on purpose. The farce was repeated in the next women's doubles between South Korea and Indonesia of Group C. They were booed and jeered by the spectators when they deliberately hit shots out of court and served into the net. After serious inquiry, the Badminton World Federation announced the disqualification of the eight female badminton players from China, South Korea and Indonesia. The scandal had caught wide attention, particularly those from the sports field and opinions on it were rather varied.

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### 1.1. *Those for the athletes*

#### 1) The loopholes of the rules shouldn't be paid by the athletes

According to the rules, all events begin with a round-robin group stage: the competitors are divided into groups and each player or Doubles pair plays everyone else in their group. The top two squads in each group then enter a single-elimination tournament, which will eventually decide the winners of the medals. After two rounds of competition, the players may figure out the possible rivals in the next rounds. Therefore, some players may try to influence the result deliberately in order to avoid meeting some particular competitors or their own teammates. This is the loophole of the competition format and can be used freely without violating the rules, which is also one of the reasons why competitive sports are so appealing. "Deliberately trying to lose" has ever occurred in the national basketball and football competitions and even in some international women volleyball matches. Chinese badminton team has performed in the same way in the previous events in order to guarantee places and double insurance. This kind of conduct is interpreted as clever tactics and strategy to win and is integrated into the whole sports activities, including sports education.

It is the format that is to blame. However, the athletes were mercilessly blamed and criticized under the flag of morality and Olympic spirit. Actually those who were behind the scene and dared not step out to shoulder the responsibility of the loopholes are the ones against the Olympic spirit.

#### 2) Eliminate the commercial operation and improve media orientation of the modern Olympics instead of simply punishing the athletes

After the commercial elements were introduced into modern Olympics, commercial behaviors of all kinds are seen everywhere in the Olympic Games, which bring about problems and stimulate materialism. The over-commercialized and politicized Olympics are drifting away from the classical Olympic spirits.

"Gold medal first" advocated by the media has been stimulating the athletes and awards in all forms have spurred them on to win the final victory. However, voices of condemnation from the media could be heard everywhere when the athletes lost the games. All these can have a negative impact on the athletes.

Commercialization has made the Olympics something of a business. When he said that "who wants to sit through something like that", the spokesman of the IOC revealed the underlining reason for punishing the match-throwing athletes, that is, athletes are actors and have the responsibility of entertaining the spectators. If so, was Usain Bolt match-throwing when he came to an abrupt halt just before the finish line and walked toward the end?

### 1.2. *Those for the IOC(the International Olympic Committee)*

Match-throwing is against the Olympic spirit of "Higher, Faster, Stronger", which encourages all participants to fight constantly and never give up easily.

The charm the Games lies in the fierce competition and the unpredictability of the games. Match-throwing disrespects the spectators as it makes the games boring. In the past, the athletes were considered clever if they adopted some tactics and strategies to win. Now the media as well as the spectators have quite different views towards championships. The only thing they want is that the players can dedicate themselves to the games and present a spectacular match.

The above-mentioned diametrical opinions can both justify themselves and can't be persuaded by the opposite side. Is it possible to find some theories in natural sciences and use them as theoretical basis to solve those controversies in sports? With ESGS and game theory from natural sciences, this paper analyzes the pros and cons of badminton match-throwing in London Olympics and attempts to offer some advice for the optimization and execution of the match rules.

## 2. 2. Theoretical Framework

### 2.1. Game Theory

Game theory starts from Von Neumann and Oskar Morgenstern's 1944 book *Theory of Games and Economic Behavior*. It is a study of strategic decision making and its equilibrium[1]. It presumes that:

- (1) all players know the game rules and the game pay-off matrix;
- (2) all players are intelligent and rational (individual rationality and individual optimal decision);
- (3) the players can't collude.

John Nash proves that there exists at least one Nash equilibrium[2] in any limited game, that is, the player is making the best decision, taking into account his/her rival's decision[3]. Match-throwing is a kind of perfect information sequential game. The following table is the Nash equilibrium analysis of the match between Chinese and Korean teams.

Table 1 The Nash equilibrium analysis of the badminton match

		Ha Jung-eun/Kim Min-jung	
		positive	negative
Yu Yang/Wang Xiaoli	positive	7,8	6,7
	negative	12,7	10,8

From the above analysis, it is easily seen that Yu Yang and Wang Xiaoli can score 7 points while Ha Jung-eun/Kim Min-jung 8 points if they play the game devotedly and Yu Yang and Wang Xiaoli can score 10 points if they try to lose deliberately. According to the game theory, it is wise and rational to throw the match.

### 2.2. Theory of Extenics

Extenics is a new cross discipline proposed by Chinese scholar Cai Wen in 1983[3]. Extenics studies the extensibility of things, the rules and methods for opening up things, and then uses them to solve problems with formalized models. Its basic theories include basic element theory, extension set theory and extension logic theory. Basic-element theory uses formalized language of matter-element, affair-element and relation element to describe all kinds of things in reality world and to establish descriptive models to solve problems[4-6]. On this basis, the process of how the contradictory problems are solved is formalized through extension analysis and extension transformation and the process of how the strategy is formed is describe through element transformation, conduction transformation, conjugate transformation and transforming bridge. The strategies formed after all the analyses and transformation will be evaluated through priority-degree evaluation and the best decision will be made [7]. All in all, Extenics studies the theories and methods of solving contradictory problems in reality [8].

According to basic element theory, all the things in the world can be categorized into matter-element, affair-element and relation element. All the objects making up nature are matters, described by matter-element; the interaction of matters is called affair, described by affair-element; there are different kinds of relations between matter and matter, affair and affair and matter and affair, described by relation-element [9]. Altogether, basic element becomes the logic cell to describe problems, shown as the ordered triad of objects, characteristics and values.

Based on Extenics, a formalized data base of problems can be established and a strategy matrix of problem solving will be formed according to the transformation rules and the strategies will be evaluated under the priority degree evaluation system [6], for example, the matters can be divided into eight parts, that is, imaginary part, real part, soft part, hard part, latent part, apparent part, negative part and positive part.

Extension set relates categorization with transformation (including time and space). According to it, both the categorization of elements and their properties (relativity) are changeable [10]. According to dependent function and transformation type, the universe of discourse is divided into the stable field, extension field and zero boundary. Extension set can describe mutual transformation between "Yes" and "No". It can express not only the process of quantitative change, but also the qualitative change; when things in excess of qualitative change point, that is, the zero boundary or extension boundary, things will be changed qualitatively [11].

### **3. The element analysis of all involved**

The following part will use Extenics to analyze the properties of all sides involved, interest focuses and the rational strategies adopted on the circumstances of match-throwing. The characteristics will be extended from the eight conjugate aspects of imaginary part, real part, soft part, hard part, latent part, apparent part, negative part and positive part in order to open up the best decision-making.

#### *3.1. OCOG(the Organizing Committee of the Olympic Games)*

OCOG is a temporary organization set up by the host country to organize the Olympic Games and the Paralympics. Its main duties are to abide by the "Olympic Charter" and the "Host City Contract", and be responsible for all that is related to the Games, such as, reception, financing, events, safety, foreign affairs, TV relaying, art performances, venue construction, function arrangement, transportation, security, volunteers, and the food and shelter of all the athletes and officials.

In this case, the OCOG helped the BWF deal with this incident and officially showed its support for the OCOG decision. It also held a press conference and suggested further inquiry into the coaches and officials involved instead of punishing the athletes only. It was made a scapegoat as public criticism was all aimed at OCOG. But actually it is the BWF that made the competition format and the punishment verdict, and the OCOG was only an assistant in the whole process.

#### *3.2. BWF(the Badminton World Federation)*

BWF is the international governing body of the sport of badminton. The BWF serve to regulate, promote, develop and popularize the sport of badminton across the globe, to organize and run the highest level international events ( the Olympic Games, World Championship, World Cup, Thomas, Uber Cups) and to draft and modify the badminton competition format.

In this case, BWF played the roles of making the competition format, inquiring the athletes, making the accusations and announcing the punishment. In the press conference, BWF accused the athletes of “not using best efforts” and “conducting oneself in a manner that is clearly abusive or detrimental to the sport”, in violation of the BWF’s code of conduct and officially disqualified the eight player for the duration of the London Olympic Games.

### 3.3. *The reactions from different countries*

The OCOG of China has always been advocating the Olympic spirit in all sports events, promoting the sportsmanship of fair play and condemning any behaviors in whatever form and for whatever reason that are against sportsmanship. Chinese sports delegation required the person in charge to inquire into why and how the scandal had happened and issued a statement to criticize what Yu Yang and Wang Xiaoli had done. When Korea and Indonesia appealed the disqualification, China didn't and acknowledged the decision by BWF.

Korean Olympic delegation appealed the disqualification after BWF announced its punishment to the eight players. Korean Badminton Federation said that they would not accept this decision and would surely appeal. After the London Olympics was over, Korean Badminton Federation gave severe punishment to those players and coaches involved, driving Jung Kyung-eun, Kim Ha-naHa, Jung-eun and Kim Min-jing out of the nation team and disqualifying them from any of the national and international competitions. Finally, under the pressure of domestic public opinions, the four players were deprived of the membership of the national team for one year and banned for six months and the two coaches were deprived of coaching qualification for four years [12].

Indonesia also appealed the disqualification. They punished the players involved, banning the two players for four months. At the same time, Indonesia hoped that the Competition forms and the formats could be reviewed and improved to prevent similar things from happening again in the future [13].

### 3.4. *Coaches*

Hours after the scandal erupted, Li Yongbo, head coach of the Chinese badminton team, apologized in public, "I don't think we thoroughly understood the rule. We've already qualified and we wanted to have more energy for the knockout rounds. As the head coach, I owe the fans and the Chinese an apology. Chinese players failed to demonstrate their fighting spirit. It's me to blame." At the same time he pointed out that the players didn't do so under his instruction. They were simply taking advantage of the format, without considering the reactions from the spectators. He promised that they would try their best to avoid things of the same kind.

Sung Han-kook, South Korea head coach, pointed fingers towards China: "It's a complicated thing with the draws. They (China) didn't want to meet each other in the semi-final." After the Korean Badminton Federation punished him severely, he didn't appeal and said he would be held accountable for the matter.

Li Mao, the former coach of Chinese badminton national team and Indonesia head coach now, pointed out that it was not the athletes who had made mistakes but the BWF. According to him, what BWF did was ridiculous.

### 3.5. *Athletes*

What Chinese athletes can do is only to accept and obey the coaches' arrangement about the matches and the strategies applied. After the punishment, the players can only follow the instructions from their superiors. Yu Yang apologized to the fans, admitting that she hadn't followed sportsmanship and failed to present a performance matching her level. Wang Xiaoli said something similar and promised to try her best in the future competitions. Players are the biggest victims in the case and no matter it was before or after the match, their voices were least heard.

Korean players expressed their complaints when they received the verdict from the Korean Badminton Federation. They claimed that they were only doing what they were asked to do by the coaches. They felt it hard to accept the fact that they got punished and driven out before the game really began. The competition format was the root of all evils.

Behind the players are the coach team and the whole nation. We should punish the coaches more than the players as the players are only puppets, who have to listen to the coaches all the time. Most importantly, the competition rules and match arrangement should be improved.

$$M = \begin{bmatrix} \text{Player A,} & \text{Nationality,} & \text{China} \\ & \text{Age,} & 20 \\ & \text{Group,} & A \\ & \text{Matchup,} & B \ 01 \\ & \text{Prospects,} & 100\% \\ & \text{Future Matchup,} & C \text{ or } D \\ & \text{.....,} & \text{.....} \end{bmatrix} \quad (1)$$

The above is the element analysis of the players. If they won this game in this round, they would meet their compatriots, but if they lost the game, they would meet a foreign pair, who was relatively weak in performance. The prime playing time for players is limited. Their best performance will be unavoidably affected by the ambiguous rules and excessive execution of the rules.

### 3.6. The media

The media had made extensive coverage on this matter and different voices could be heard: some blamed the players, some felt sorry for the players and some others voiced their questions on BWF. Among the reports, the key words to criticize the players are “exile from the Olympics, disgrace, scandal, deliberately trying to lose, against the Olympic spirit, punishment, improper behavior”.

Key words that show sympathy for the players include “the most severe punishment, reflection, dignity, integrity, questioning the new competition format, courageous enough to tell the truth, appeal, rights”. Key words that question the competition system are as follows: the competition system is the root of all evils, rules in disorder, abusing rights, loopholes in the system, a decision disregarding human rights, dictatorship.

### 3.7. Relation analysis

OCOG and BWF collaborate with each other and support each other. The state supervises the coaches and the players and has the right to command them whenever in need. What the coaches and the players do should be in accordance with the interest of the nation.

Coaches are in command of the players, who should always listen to the coaches on and out of the court in terms of tactics and strategies.

Public opinions supervise and evaluate IOC and BWF. Public opinions will also influence the national decisions on Olympic strategies; in turn, the state will use the orientation function of the media and public opinions to achieve the expected effect. Also, Public opinions influence the behaviors of the coaches and players, especially the performance of the players; in return, the behaviors of the coaches and players will influence public opinions.

The above part has made a relation-element analysis. In the following part, the basic reasons and countermeasures will be analyzed from the perspective of ESGS.



#### **4. Constructive countermeasures based on ESGS(Extension Strategy Generating System)**

##### *4.1. Analysis on the reasons for match-throwing*

The competition format is the direct cause of the match-throwing. The loopholes in the format made it possible for the coaches and the players to make use of the loopholes, which consequently led to match-throwing. In addition, because nobody had ever been punished under this new format before, the coaches and players didn't give much thought to the consequences of match-throwing before they chose to do so.

Ever since the resurrection of the modern Olympics in 1896, the athletes have been representing the whole country rather than the individuals themselves. The sports level of a country is regarded as one external form of aggregate national strength. What a participating country pursues is not just "higher, faster, stronger", but the number of gold medal, which is more self-evident in China. The purpose of this match-throwing is to sweep the gold medal and the silver medal for the state interest.

The whole society pursues good result, fame and gold medal, which has led to match-throwing in all kinds of events. The two Chinese pairs were given high expectations to win the medals as they were the top 2 pairs in this field. The media's attention gave them more pressure. Under these circumstances, it was a must to avoid meeting their compatriots before the final and thus match-throwing became inevitable.

Due to the imbalance of development in the sports events, several players from the same country will win through to the knockout stage after the round-robin stage, which will lead to match-throwing as the players from the same country certainly are unwilling to meet each other at this stage and the weak team is unwilling to meet the strong one.

People may have different understandings of the competition format and immorality. One of the reasons for match-throwing is that coaches and players thought it was a proper strategy to win the final victory.

##### *4.2. Analysis on the consequences*

###### **1) The match was less enjoyable**

That the match was less entertaining is the direct consequence of match-throwing. The spectators can be categorized into three kinds: those in spot, fans and ordinary ones. To those in spot, they expected to watch a spectacular match, which should match the money they spent on the tickets. However, it was not the case and they were disappointed; to the fans, they expected to see the fierce competition between the pairs of high level, but match-throwing blemished their enthusiasm toward badminton and thus they were dissatisfied; to the ordinary viewers, they focused more on the result and they thought match-throwing was quite understandable.

###### **2) Commercial income was lowered**

OCOG attracts sponsors by the number of viewers, which is dependent on the wonderfulness of the matches. Take volleyball for example. The International Volleyball Federation modified the rules and added a 30-second technical suspension into the matches. During the interval, advertisements can be shown. The purpose is to increase the revenue. If the match is not entertaining and the audience rating is low, the sponsors will have no interest in investing.

3) The expectation on badminton was lowered. One or two match-throwing will not do any harm to the development of badminton, but if it continues like this, its development will be affected through business operation.

4) Media attention is raised. Match-throwing set people discussing the morality, format and system behind the scene, which can help the perfection of the system.

5) The competitors were harmed. The competitors can only take part in the Olympics once in four years. They expect not only to achieve good result but also to fully display themselves. Match-throwing was against their will and disqualification made bad to worse, which might affect their future career ( it indeed did so in this case). Moreover, the negative public opinions imposed great pressure on the players.

6) The coaches were not affected too much. Match-throwing was the strategy adopted by the coaches. The punishment to them is varied. Some are severe, but some are not: the Korean head coach was dismissed while the Chinese head coach received no punishment at all.

#### *4.3. Transformation strategy from the perspective of Extension set*

##### 1) Element transformation

The misbehavior of the players, coaches and referees should be rectified. Match-throwing is not a matter of morality but one of tactics. Referees, OCOG and BWF should strengthen the monitoring of the matches and respond simultaneously to nip match-throwing in bud. If match-throwing is happening, get one player punished as a warning to others.

##### 2) Rules transformation

As soon as the defects in the competition format is detected, use information technology to amend the rules and event arrangement and let the computer decide the next matchup according to the match data to secure the interest of the seed players, for example, to give the winner the priority to choose matchups. It takes time to amend and execute the rules and they should be in accordance with the international laws and civil laws.

BWF can draw on the experiences of other events in terms of the match format and the definition of match-throwing. For example, the 16 teams can be divided into 2 groups and each competes in single round-robin. The first four teams won through to the knockout stage. The team in the first place in one group must play against the team in the fourth place from the other team and the other two from both groups can decide whom they will play against by drawing lottery. The other method is as follows: the rest of the current rules remain unchanged, but after the round-robin stage, the team in the first place from each group can decide the team they will play against by drawing lottery.

Add more rules on the judgment and punishment of match-throwing. Lessons can be learned from Judo event, which specifies everything related to match-throwing. Punishment on match-throwing can also be reduced, for example, to deduce their scores in the following knockout stage. New competition format should be tested before important international games. Punishment can be segmented: warn the players first, and if they continue in the same way, punishment will be given.

##### 3) Transformation of universe of discourse

Change the place of group competition (including country. Some particular events can be held in non-host countries, such as a country where the event is loved by most of the populace); change the competition time. The essence of solving the problems is to amend the rules rather than punish the players. They are actually the biggest victims and the disadvantaged group. How to secure their own interest and how to win the tolerance and understanding of BWF, the spectators and the country are all problems the players can find an easy solution.

## **5. Summary and Prospects**

Using game theory and ESGS, this paper gives a systematic analysis on the badminton match-throwing in London Olympics, revealing that the basic reason for this case lies in the loopholes of the competition format and it is a rational strategy adopted by the players to win the final victory. Under the business operation of the Olympics, some players fell into victims of the incident. By means of conjugate analysis and transformation based on Extension set, ESGS can open up new ways to solve problems of this kind and offer more solutions. This paper is a tentative and preliminary application of scientific theories and tools in the sports field. With the systematic application of ESGS, how to lay down competition rules more comprehensively and how to strengthen the predictability, compatibility and adaptability of the rules are subjects worth further and deeper research.



## References

- [1] Liang Wei. Analysis of Public Decision-making on Game Theory. *Journal of Hubei University of Economics (Humanities and Social Sciences)*, 2012, 01:45-46.
- [2] John F·Nash. Non-Cooperative Games, Ph.D. diss, Princeton University,1950.5.
- [3] John F·Nash. Non-Cooperative Games,*The Annals of Mathematics*,1951.
- [4] Cai Wen. Extension and It's Application. *Chinese Sciences Bulletin*, 1999, 44(7):673-682.
- [5] Cai Wen. Extension Set and the Incompatibility Problem. *Journal of Scientific Exploration*,1983,(1):83-87.
- [6] Yang Wen-yan,Cai Wen. Extension Engineering. Beijing:Science Press, 2007 .
- [7] Li Xing-sen. From no silver bullet to the silver bullet processing. *Software World*, 2007, 09:64-66.
- [8] Zhu Wei-wen, Fang Yao-mei .The Model and Computer Application for In-school Assessment of Undergraduate Teaching Quality Based on Extenics. *Journal of Guangdong University of Technology*, 2002,02:97-102.
- [9] Li Xing-sen,Liu Yan-bin.Study on the Relationship among Extenics,Information Management and Knowledge Management in the Knowledge Economy.*Contemporary Economy & Management*, 2011,11:6-9.
- [10] Hu Bo-lei.Research on the Application of Extenics in Classification. Harbin Engineering University, 2006.
- [11] Cai Zhuo-heng.The Research of Knowledge Representation and Strategy Generating Based on Extension Theory.Guangdong University of Technology, 2007.
- [12] <http://zt.my/News/NewsShow-77050.html>,2012-8-1.
- [13] <http://sports.sohu.com/20120906/n352481756.shtml>,2012-09-06.